

METHOD AND DEVICE FOR PRODUCING NOZZLE-TYPE  
 OPENINGS IN SPRAY ARMS FOR DISHWASHER MACHINES

The invention relates to a method and device for producing  
 5 nozzle-type openings in spray arms for dishwasher machines.

In known methods and devices for producing nozzle-type  
 openings in spray arms for dishwasher machines the spray  
 arms comprised of plastic are produced by means of a so-  
 10 called extrusion blowing procedure, i.e. a granulate or  
 pulverulent plastic is plasticised in a thermal method and  
 this highly viscous mass is then put into a corresponding  
 form by a moulding tool. Because the spray arms are  
 15 designed hollow, a hose produced according to the  
 abovedescribed extrusion process is utilised as starting  
 body for producing the spray arms, which is heated to a  
 certain temperature and in this deformable state is pressed  
 by a corresponding blowing procedure into a cooled profile  
 tool. The resulting spray arm blank exhibits all the  
 20 features of the finished spray arm, including the recessed  
 nozzle-type openings, which must be produced in a second  
 manufacturing step.

Because the nozzle-type openings are openings, it is  
 25 currently not possible to produce the nozzle-type openings  
 during the extrusion blowing procedure. For this the  
 regions of the spray arm blank, provided for the nozzle-  
 type openings, are designed as so-called domes, which must  
 be removed or respectively processed in a further  
 30 manufacturing process.

In conventional terms the spray arm blanks for producing  
 the nozzle-type openings are subjected to a cutting or  
 35 machining process, whereby the nozzle-type openings are  
 made by means of cutters or milling heads, i.e. finger

millers and/or spiral borers, for example in that the projecting domes are excised or milled off.

5 Conventional methods method for producing nozzle-type openings in spray arms are therefore cost-intensive and require subsequent processing devices in which the spray arm blanks must be clamped, which undergo a certain wear and subsequently maintenance.

10 It has also proven disadvantageous that variations of the nozzle-type openings in the spray arms make refitting the reworking devices necessary, since in particular each form of the nozzle-type openings is of decisive importance also as the angle of the nozzle duct for operation of the spray  
15 arm, though refitting and adapting the reworking devices is time-intensive, mechanically demanding and cost-intensive. An additional outcome is time and cost-intensive expenditure for test runs of the devices and mould production of the spray arms.

20 The object of the present invention is therefore to provide a device and a method for producing nozzle-type openings in spray arms for dishwasher machines, which enables the form of the nozzle-type openings in spray arms to alter rapidly  
25 even if only one spray arm is provided and enable different nozzle geometries to be created during the production process in the event of different spray arms.

30 This task is solved by the inventive method having the characteristics according to Claim 1 and by the inventive device having the characteristics of the other independent claim. Advantageous further developments of the present invention are characterised in the sub-claims.

35 With the inventive method for producing nozzle-type openings in spray arms for dishwasher machines nozzle-type openings of differing shape are cut out by laser from the

surface of the spray arm blank after the spray arm blank has been produced.

5 With the inventive use of laser it can be guided such during this excising of the nozzle-type openings that the walls of the nozzle duct are designed such that there are desired, and not unnecessary, turbulence of the emerging spray stream in the vicinity of the nozzle exit, i.e. the flow behaviour of the spray stream can be adjusted by  
10 corresponding use of the behaviour of the spray stream by corresponding use of the laser. Because the nozzle-type openings are sharp-edged e.g. this can create constriction of the discharge stream, determined by the discharge quantity  $u$ . The result of this discharge quantity  $u$  is an  
15 increase in the nozzle cross-section surface, by which blockages or contamination of the nozzle-type openings are prevented.

The openings can advantageously have different forms, which  
20 deviate from a circular form, such as for example ellipsoid, corrugated, rectangular, rhombic etc.

In a preferred variant of the inventive method the laser for excising the nozzle-type openings can be shifted and  
25 pivoted slightly in its position, so that not only can the form of the nozzle ducts be designed variously, but also the nozzle duct as such can have different angles of inclination.

30 The inventive device for carrying out a method for producing nozzle-type openings has a device for fixing the spray arm blank and a correspondingly positionable laser, arranged on the fixing device such that the surface of the spray arm blank can be fitted with nozzle-type openings.

35 The advantage of the inventive device is that the laser used to cut out the nozzle-type openings is configured to

vary slightly in its position to the surface of the spray arm, so that different patterns for the arrangement of the openings can be made after short set-up times or respectively reprogramming times.

5

It is of particular advantage here that no mounting of the laser is to undergo any mechanical force and thus a device can be selected, which is cost-effective to produce.